What is claimed is:

1. A device for evaluating quality in a telephonic voice connection in a telecommunications network, the device comprising:

a measurement circuit operative to measure at least one characteristic of the telephonic voice connection; and

a processor coupled to the measurement circuit, the processor being operative to calculate a solution to at least one empirically derived mathematical function by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection.

2. The device of claim 1, wherein the at least one empirically derived mathematical function is a cumulative probability distribution function.

3. The device of claim 1, wherein the at least one empirically derived mathematical function includes a first function (P_N) representing a proportion of users that will perceive the telephonic voice connection as having no impairment, a second function (P_S) representing a proportion of users that will perceive the telephonic voice connection as having some impairment, and a third function (P_M) representing a proportion of users that will perceive the telephonic voice connection as having much impairment, where $P_N + P_S + P_M = 1$.

4. The device of claim 3, wherein the first function includes the equation

$$P_N = \exp [-a(x-c)^b].$$

5. The device of claim 4, wherein a and b are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

6. The device of claim 3, wherein the third function includes the equation

$$P_M = 1 - \exp [-d(x-c)^e].$$

7. The device of claim 6, wherein d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

8. The device of claim 3, wherein the second function is characterized by the equation

$$P_S = \exp [-a(x-c)^b] - \exp [-d(x-c)^e].$$

9. The device of claim 8, wherein a, b, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

10. The device of claim 1, wherein the at least one characteristic is selected from the group consisting of C-message noise, magnitude of average power of speech, magnitude of average power of a quiet channel, echo path delay, echo path loss, a speech distortion indicator, and a dropped frame rate in a packet switched network.

11. The device of claim 1, wherein the network is a packet switched network

12. The device of claim 1, wherein the network is a circuit switched network.

13. The device of claim 1, further comprising a network interface coupled to the measurement circuit, the network interface being operative to establish the telephonic voice connection between the device and the network.

14. The device of claim 1, further comprising:

a memory operative to store at least one empirically derived mathematical function having at least one independent variable; and

an interface control circuit coupled to the memory, the interface control circuit being adapted to receive a revised at least one empirically derived mathematical function from an external device, and store the revised at least one empirically derived mathematical function in the memory.

15. A circuit switched telecommunications network comprising the device of claim 1.

16. A packet switched telecommunications network comprising the device of claim 1.

17. A telecommunications switching device comprising the device of claim 1.

18. A method for evaluating quality in a telephonic voice connection in a telecommunications network, the method comprising:

establishing a telephonic voice connection;

measuring at least one characteristic of the telephonic voice connection; and

calculating a solution to at least one empirically derived mathematical function by using the at least one measured characteristic as an independent variable in the at least one empirically derived mathematical function, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection.

19. The method of claim 18, wherein the at least one empirically derived mathematical function further comprises:

a first function (P_N) representing a proportion of users that will perceive the telephonic voice connection as having no impairment;

a second function (P_S) representing a proportion of users that will perceive the telephonic voice connection as having some impairment; and

a third function (P_M) representing a proportion of users that will perceive the telephonic voice connection as having much impairment, wherein $P_N + P_S + P_M = 1$.

20. The method of claim 18, wherein the at least one empirically derived mathematical function includes the equation:

$$P_N = \exp [-a(x-c)^b],$$

wherein P_N represents a proportion of users that will perceive the telephonic voice connection as having no impairment, a and b are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

21. The method of claim 18, wherein the at least one empirically derived mathematical function includes the equation:

$$P_M = 1 - \exp [-d(x-c)^e],$$

wherein P_M represents a proportion of users that will perceive the telephonic voice connection as having much impairment, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

22. The method of claim 18, wherein the at least one empirically derived mathematical function includes the equation:

$$P_S = \exp [-a(x-c)^b] - \exp [-d(x-c)^e],$$

wherein P_S represents a proportion of users that will perceive the telephonic voice connection as having some impairment, a, b, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

23. The method of claim 18, further comprising the step of providing a device for evaluating quality in a telephonic voice connection in a telecommunications network, the device includes a processor that is operative to calculate the solution to the at least one empirically derived mathematical function by using the at least one characteristic as an independent variable in the at least one empirically derived mathematical function.

24. The method of claim 23, further comprising the step of using the device to evaluate a portion of the telecommunications network.

25. The method of claim 24, wherein the portion of the telecommunications network is in service.

26. The device of claim 18, wherein the at least one characteristic is selected from the group consisting of C-message noise, magnitude of average power of speech, magnitude of average power of a quiet channel, echo path delay, echo path loss, a speech distortion indicator, and a dropped frame rate in a packet switched network.

27. The device of claim 18, wherein the network is a packet switched network

28. The device of claim 18, wherein the network is a circuit switched network.

29. A programmable device for evaluating quality in a telephonic voice connection in a telecommunications network, the device comprising:

a memory operative to store at least one empirically derived mathematical function having at least one independent variable;

a processor coupled to the memory, the processor being operative to calculate a solution to the at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection; and

an interface control circuit coupled to the memory, the interface control circuit being adapted to receive a revised at least one empirically derived mathematical function from an external device, and store the revised at least one empirically derived mathematical function in the memory.

30. The programmable device of claim 29, further comprising:

a network interface, the network interface being operative to establish the telephonic voice connection between the device and the network; and

a measurement circuit coupled to the network interface, the measurement circuit being operative to measure the at least one measured characteristic of the telephonic voice connection.

31. The programmable device of claim 29, wherein the at least one empirically derived mathematical function includes the equation:

$$P_N = \exp [-a(x-c)^b],$$

wherein P_N represents a proportion of users that will perceive the telephonic voice connection as having no impairment, a and b are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

32. The programmable device of claim 29, wherein the at least one empirically derived mathematical function includes the equation:

$$P_M = 1 - \exp [-d(x-c)^e],$$

wherein P_M represents a proportion of users that will perceive the telephonic voice connection as having much impairment, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

33. The programmable device of claim 29, wherein the at least one empirically derived mathematical function includes the equation:

$$P_S = \exp [-a(x-c)^b] - \exp [-d(x-c)^e],$$

wherein P_S represents a proportion of users that will perceive the telephonic voice connection as having some impairment, a, b, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

34. The device of claim 29, wherein the at least one characteristic is selected from the group consisting of C-message noise, magnitude of average power of speech, magnitude of average power of a quiet channel, echo path delay, echo path loss, a speech distortion indicator, and a dropped frame rate in a packet switched network.

35. The device of claim 29, wherein the network is a packet switched network

36. The device of claim 29, wherein the network is a circuit switched network.

37. A method for fabricating a device for evaluating quality in a telephonic voice connection in a telecommunications network, the method comprising:

empirically acquiring user perception data by having at least one test subject listen to a plurality of test messages, and rate the quality of each test message in accordance with at least one user perceived impairment characteristic;

modeling the user perception data as at least one mathematical function, the at least one mathematical function being graphically represented by a two dimensional curve having a shape, the shape of the curve being determined by a set of constants employed in the at least one mathematical function;

choosing values for the set of constants to thereby fit the two-dimensional curve to the user perception data to thereby generate at least one empirically derived mathematical function;

converting the at least one empirically derived mathematical function into a set of computer executable instructions; and

programming the device with the set of computer executable instructions.

38. The method of claim 37, wherein the step of empirically acquiring user perception data further comprises the steps of:

selecting a plurality of user perceived impairment characteristics;

selecting a plurality of quality characteristics of the voice signal, each of the quality characteristics affecting the quality of the voice signal as perceived and described by users;

generating a plurality of voice messages by varying selected ones of the plurality of quality characteristics;

acquiring user perception data by having the at least one test subject listen to the plurality of voice messages, the at least one test subject rating the quality of the plurality of voice messages in accordance with the plurality of user perceived impairment characteristics; and

transforming the each of the plurality of user perceived impairment characteristics into quantifications of each of the plurality of objective characteristics.

39. The method of claim 38, wherein the plurality of objective characteristics are selected from the group consisting of C-message noise, magnitude of average power of speech, magnitude of average power of a quiet channel, echo path delay, echo path loss, a speech distortion indicator, and a dropped frame rate in a packet switched network.

40. The method of claim 38, wherein the plurality of user perceived impairment characteristics includes volume level, noise level, speech distortion, and echo.

41. The method of claim 40, wherein the plurality of user perceived impairment characteristics are transformed into estimates, each estimate being a proportion of a population of users that would describe the telephonic voice connection as having no impairment, some impairment, or much impairment.

42. The method of claim 38, wherein the at least one empirically derived mathematical function includes a first function (P_N) representing a proportion of users that will perceive the telephonic voice connection as having no impairment, a second function (P_S) representing a proportion of users that will perceive the telephonic voice connection as having some impairment, and a third function (P_M) representing a proportion of users that will perceive the telephonic voice connection as having much impairment, where $P_N + P_S + P_M = 1$.

43. The method of claim 42, wherein the first function is characterized by the equation, $P_N = \exp [-a(x-c)^b]$.

44. The method of claim 43, wherein a and b are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

45. The method of claim 42, wherein the third function is characterized by the equation, $P_M = 1 - \exp [-d(x-c)^e]$.

46. The method of claim 42, wherein d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

47. The method of claim 42, wherein the second function is characterized by the equation, $P_S = \exp [-a(x-c)^b] - \exp [-d(x-c)^e]$.

48. The method of claim 47, wherein a, b, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

49. A computer readable medium having computer executable instructions for performing a method, the method comprising:

establishing a telephonic voice connection;

measuring at least one characteristic of the telephonic voice connection; and

calculating a solution to at least one empirically derived mathematical function by using at least one measured characteristic as an independent variable of the at least one empirically derived mathematical function.

50. The method of claim 49, wherein the solution is an estimate of likely user perception of the quality of the telephonic voice connection.

51. The method of claim 49, wherein the at least one empirically derived mathematical function includes the equation:

$$P_N = \exp [-a(x-c)^b],$$

wherein P_N represents a proportion of users that will perceive the telephonic voice connection as having no impairment, a and b are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

52. The method of claim 49, wherein the at least one empirically derived mathematical function includes the equation:

$$P_M = 1 - \exp [-d(x-c)^e],$$

wherein P_M represents a proportion of users that will perceive the telephonic voice connection as having much impairment, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

53. The method of claim 49, wherein the at least one empirically derived mathematical function includes the equation:

$$P_S = \exp [-a(x-c)^b] - \exp [-d(x-c)^e],$$

wherein P_S represents a proportion of users that will perceive the telephonic voice connection as having some impairment, a, b, d and e are empirically derived constants, and c represents a noise level that substantially all users would perceive as being unacceptable.

54. The method of claim 49, wherein the computer readable medium is selected from the group consisting of a DRAM, ROM, PROM, EEPROM, a hard drive, or compact disk.

55. The method of claim 49, wherein the method is performed by a telecommunications switching device coupled to the computer readable medium.

56. The method of claim 55, wherein the telecommunications switching device is disposed in a central office in a telecommunications network.

57. The method of claim 55, wherein the telecommunications switching device is a circuit switch.

58. The method of claim 55, wherein the telecommunications switching device is a packet switch.

59. The method of claim 49, wherein the method is performed by a Test Quality Measurement System (TQMS) coupled to the computer readable medium.

60. The method of claim 49, wherein the method is performed by a OEM equipment coupled to the computer readable medium.

61. A programmable device for evaluating quality in a telephonic voice connection in a telecommunications network, the device comprising:

a memory operative to store at least one empirically derived mathematical function having at least one independent variable;

an interface control circuit coupled to the memory, the interface control circuit being adapted to receive revised empirically derived data from an external device, and store the revised empirically derived data in the memory; and

a processor coupled to the memory, the processor being programmed to

calculate a revised at least one empirically derived mathematical function using the revised empirically derived data, and

calculate a solution to the revised at least one empirically derived mathematical function by using at least one measured characteristic as the independent variable, whereby the solution is an estimate of likely user perception of the quality of the telephonic voice connection.